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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,494	03/12/2004	Stefan Bohm	P04,0080	8260

26574 7590 04/02/2007

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EXAMINER	
ALLISON, ANDRAE S	
ART UNIT	PAPER NUMBER
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/799,494	BOHM ET AL.
	Examiner	Art Unit
	Andrae S. Allison	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/15/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because:

Figure 1 should have been labeled "Prior Art".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 8-13 and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Ganin et al (Pub No.: US 2002/0085672) in view of Maack et al (US Patent No.: 6,920,201).

As to independent claim 1, Ganin discloses a method for determining and documenting, from current image date, x-ray exposure values employed for producing an x-ray exposure or an x-ray image acquisition sequence in an x-ray diagnostic apparatus (automatic exposure control and exposure optimization for x-ray imaging systems, [p][0001], lines 1-3), comprising the steps of: electronically irradiating a radiation detector (22, see Fig 1) with x-rays to expose an exposed image region comprised of pixels each having a grey scale value (see [p][0013], lines 3-8); electronically determining a region of interest (see [p][0016], lines 5-8) within said exposed image region (see [p][0016], line 5); electronically calculating an x-ray image exposure value for the region of interest from the grey scale values of the pixels in the region of interest ([p][0019-0032]); electronically normalizing the x-ray image exposure value to a signal value, to obtain a normalized value (see [p][0040], lines1-3, where patient data is normalized); electronically determining at least one independent measurement value employed in the x-ray diagnostic apparatus for generating said

exposed image region (see [p][0042], lines 1-10, where the look up tables for the x-ray imaging system includes imaging technique values); electronically mathematically converting said normalized value into a physical unit using said measurement value (see [p][0042], lines 5-10 where the normalized value is used to adjust patient radiation dosage);

Ganin teaches storing the processed image (see [p][0014], lines 1-4) however, does not expressly disclose electronically storing said physical unit in association with said measurement value for documentation. Maack discloses an x-ray device which is provided with storage arrangement (see column 1, lines 7-9) that includes electronically storing said physical unit in association with said measurement value for documentation (see column 2, lines 15-22, where old exposures values are replaced with new exposure value). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Gainin and Maack so that the x-ray device "learns" the optimum exposure parameter for its relevant groups of user because difference x-ray institutes or clinics customarily use difference adjusting techniques, such as new sets of exposure parameters may differ from one institute to another (see column 2, lines 21-26). Furthermore, storing the exposure parameters allows a radiologist or user of the x-ray device to easily recall the exposure values use during the acquisition of x-ray images for a particular patient.

As to independent claim 20, this claim differs from claim 1 only in that claim 20 is apparatus whereas, claim 1 is method and the limitations an x-ray source for emitting x-

rays, a radiation detector on which said x-rays are incident, said radiation detector generating an electrical output signal dependent on the x-rays incident thereon, an image system supplied with said output signal from said radiation detector for generating an image signal from said output signal; a display device for displaying an image corresponding to said image signal; said image system comprising an exposed image region determination unit, supplied with the output signal from said radiation detector, for determining an exposed image region of said radiation detector, an ROI determination unit, a first calculation unit, a normalization unit, a measurement unit, a second calculation, a physical unit and a storage unit for storing said physical unit in association with said measurement value for documentation are additively recited.

Ganin clearly teaches a x-ray system (see Fig 1) comprising: an x-ray source for emitting x-rays, a radiation detector (22, see Fig 1) on which said x-rays are incident, said radiation detector generating an electrical output signal dependent on the x-rays incident thereon ([p][0013], lines 6-7), an image system (28, see Fig 28) supplied with said output signal from said radiation detector for generating an image signal from said output signal ([p][0014], lines 2-4); a display device (32, see Fig 1) for displaying an image corresponding to said image signal ([p][0014], lines 4-5); said image system comprising an exposed image region determination unit (27, see Fig 1), supplied with the output signal from said radiation detector, for determining an exposed image region of said radiation detector ([p][0013], lines 11-14), an ROI determination unit (26, see Fig 1), a first calculation unit (26, see Fig 1), a normalization unit (26, see Fig 1), a

measurement unit (26, see Fig 1), a second calculation (26, see Fig 1) and a physical unit (34, see Fig 1).

Ganin teaches a storage unit (30, see Fig 1) however does not expressly disclose a storage for storing said physical unit in association with said measurement value for documentation. Maack discloses an x-ray device (see Fig 1) that includes a storage (102, see Fig 1) for storing said physical unit in association with said measurement value for documentation (see column 4, lines 35-40). Thus combining Gain with Maack would meet the claim limitation for the same reasons as discussed with respect to claim 1 above.

As to claim 2, Ganin teaches the method comprising electronically determining said region of interest by electronically dividing exposed image region into a plurality of areas of equal size, and selecting at least one of said areas as said region of interest (note that the patient data is segmented into rectangular region interest, see [p][0036], lines 1-4).

As to claim 8, Ganin teaches the method comprising differently weighting the grey scale values of the respective areas ([p][0036], lines 11-26).

As to claim 9, note the discussion above, Maack teaches the method comprising electronically calculating said x-ray image exposure value by forming a mean value of the grey scale values of pixels in said region of interest (see column 4, lines 55-56).

As to claim 10, note the discussion above, Maack teaches the method electronically discarding a plurality of highest grey scale values in said region of interest and a plurality of lowest grey scale values in said region of interest before electronically calculating said mean value (note that only the mean value was used for calculating the exposure value, therefore it would have been obvious to discard the other grey scale values, see column lines 51-67).

As to claim 11, note the discussion above, Maack teaches the method comprising electronically calculating said x-ray image exposure value by forming a median value of the grey scale values of pixels in said region of interest (see column 4, lines 55-56).

As to claim 12, note the discussion above, Maack teaches the method comprising electronically discarding a plurality of highest grey scale values in said region of interest and a plurality of lowest grey scale values in said region of interest before electronically calculating said median value (note that only the mean value was used for calculating the exposure value, therefore it would have been obvious to discard the other grey scale values, see column lines 51-67).

As to claim 13, Ganin teaches the method wherein the step of electronically mathematically converting said normalized value to a physical unit comprises employing

a mathematical model in the conversion (see [p][0041], lines 1-9).

As to claim 16, Ganin teaches the method comprising mathematically converting said normalized value to said physical unit comprises obtaining a raster of measurements selected from the group consisting of an actual kV value used to generate said x-rays, a signal strength of the output signal from said radiation detector, and an estimated radiation hardness increase due to filtering of said x-rays and an effect of a patient on the x-rays and interpolating from said raster (see [p][0042], lines 1-21).

As to claim 18, Ganin teaches the method comprising electronically determining said exposed image region directly from the output signal from said radiation detector, with no processing of said output signal from said radiation detector (see [p][0016], lines 1-12).

As to claim 19, Ganin teaches the method comprising processing the output signal from the radiation detector, using a processing algorithm, to produce a processed signal, and before electronically determining said exposed image region, electronically operating however, Ganin does not specifically mentions said processed signal using an algorithm that is an inverse of said processing algorithm, to restore said output signal of said detector prior to said processing with said processing algorithm. However, it would have been obvious to have processed signal using an algorithm that is an inverse of

said processing algorithm, to restore said output signal of said detector prior to said processing with said processing algorithm so as to undo any preprocessing on the patient image data before performing further processing such as filtering on the images (OFFICIAL NOTICE).

Claim 21 differ from claim 9 only in that claim 9 is a method claim whereas, claim 21 is an apparatus claim. Thus, claim 21 is analyzed as previously discussed with respect to claim 9 above.

As to claim 22, Ganin teaches an x-ray diagnostic apparatus comprising a filter (spectral filter, [p][0038], lines 1-2) for filtering said x-rays with a filter value, and wherein said x-ray source employs a kV value for generating said x-rays and has a mAs value associated therewith, and wherein said measurement device measures said kV value, said mAs value and said filter value as a plurality of said measurement values ([p][0038], lines 1-7).

Claim 23 differ from claim 13 only in that claim 13 is a method claim whereas, claim 23 is an apparatus claim. Thus, claim 23 is analyzed as previously discussed with respect to claim 13 above.

4. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Ganin et al (Pub No.: US 2002/0085672) in view of Maack et al (US Patent No.: 6,920,201) further in view of Walker et al (Pub No.: 2003/0165216).

As to claim 3, Ganin teaches the method wherein said exposed image region has two perpendicular dimensions (note that the segments are rectangular, therefore, the segments have two perpendicular dimensions, see [p][0036], lines 1-4), however, Ganin does not expressly disclose wherein the step of determining the region of interest comprises dividing said exposed image region into nine areas with three divisions in each of said dimensions. Walker discloses a an x-ray imaging system ([p][0001], lines 1-2) that includes the step of determining the region of interest comprises dividing said exposed image region into nine areas with three divisions in each of said dimensions (see Fig 4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Ganin as modified by Mack and Walker to predict optimal exposure technique parameter for an x-ray image by defining the region of interest using a matrix of N x M simple geometric shapes (see [p][0005], lines 2-4 and [p][0007], lines 7-9).

As to claim 4, note the discussion above, Walker teaches the method wherein said nine areas include a middle area, and selecting said middle area as said region of interest (see Fig 7).

As to claim 5, note the discussion above, Walker teaches the method comprising

selecting a combination composed of plurality of said areas as said region of interest (see Fig 9).

As to claim 6, note the discussion above, Walker teaches the method comprising forming said combination from a plurality of non-contiguous areas (see Fig 8).

As to claim 7, note the discussion above, Walker teaches comprising forming said combination from a plurality of contiguous areas (see Fig 9).

5. Claims 14-15, 17 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Ganin et al (Pub No.: US 2002/0085672) in view of Maack et al (US Patent No.: 6,920,201) further in view of Bothe et al (US Patent No.: 6,977,989).

As to claim 14, Ganin does not expressly disclose the method comprising converting said normalized value to said physical unit by electronically calculating a spectrum of said x-rays striking said radiation detector from a model for a kV value employed to generate said x-rays and an assumed increase in radiation hardness due to filtering of said x-rays and an effect of a patient on said x-rays. Bothe teaches a method for limiting radiation dose applied to an object which includes converting said normalized value to said physical unit by electronically calculating a spectrum (see Fig 4) of said x-rays striking said radiation detector from a model for a kV value employed to

generate said x-rays and an assumed increase in radiation hardness due to filtering of said x-rays and an effect of a patient on said x-rays (column 5, lines 1-9). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Ganin as modified by Mack and Bothe for exposure control in which a selectable maximum input dose rate is not exceeded, irrespective of the control curve and the irradiation conditions, that is, notably when use is made of an automatic exposure device (column 2, lines 1-6).

As to claim 15, Ganin teaches the method comprising calculating a radiation dose as said physical unit (see [p][0042], lines 5-10 where the normalized value is used to adjust patient radiation dosage).

As to claim 17, note the discussion above, Bothe wherein said physical unit is a radiation dose, and wherein the step of electronically converting said normalized value into said radiation dose comprises calculating said radiation dose from a linear transformation between said normalized value and said radiation dose (see Fig 4).

Claim 24 differ from claim 17 only in that claim 17 is a method claim whereas, claim 24 is an apparatus claim. Thus, claim 24 is analyzed as previously discussed with respect to claim 17 above.

Conclusion

The prior art made part of the record and not relied upon is considered pertinent to applicant's disclosure.

Relihan et al (US Patent No.: 6,233,310) is cited to teach (US Patent No.:) is cited to teach an exposure management and control system method and system.

Neumann et al (US Patent No.: 6,259,767) is cited to teach an x-ray device including an adjustable diaphragm unit.

Green et al (US Patent No.:6,768,784) is cited to teach an x-ray image enhancement.

Bracess et al (US Patent No.: 6,650,729) is cited to teach a device and method for adapting the radiation dose of an x-ray source.

Ruetten et al (US Patent No.: 6,760,405) is cited to teach an exposure control in an x-ray image detector.

Brendler et al (US Patent No.: 6,754,307) is cited to teach a method and device for x-ray exposure control.

Ganin et al (US Patent No.: 6,459,765) is cited to teach an automatic exposure control and optimization in digital x-ray radiography.

Inquires

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrae S. Allison whose telephone number is (571)

270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

March 22, 2007

AA

JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER